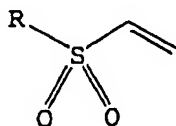


CLAIMS

1. A non-aqueous electrolyte comprising (i) a non-aqueous solvent and (ii) an electrolyte salt dissolved therein and (iii) a vinyl sulfone derivative having the formula (I):

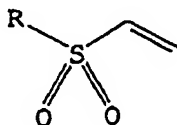


(I)

- wherein R indicates a C₁ to C₁₂ alkyl group, C₂ to C₁₂ alkenyl group, or C₃ to C₆ cycloalkyl group.
2. A non-aqueous electrolyte as claimed in claim 1, wherein said non-aqueous solvent is mainly composed of a cyclic carbonate and a cyclic ester and a optionally linear carbonate.
3. A non-aqueous electrolyte as claimed in claim 1, wherein the electrolyte salt is at least one compound selected from the group consisting of LiPF₆, LiBF₄, LiClO₄, LiN(SO₂CF₃)₂, LiN(SO₂C₂F₅)₂, LiC(SO₂CF₃)₃, LiPF₃(CF₃)₃, LiPF₃(C₂F₅)₃, LiPF₄(C₂F₅)₂, LiPF₅(iso-C₃F₇), and LiPF₄(iso-C₃F₇)₂.
4. A non-aqueous electrolyte as claimed in claim 2, wherein the electrolyte salt is LiBF₄.
5. A non-aqueous electrolyte as claimed in claim 1, wherein the content of the vinyl sulfone derivative (I) is 0.01 to 20% by weight, based upon the total amount of the electrolyte.
6. A non-aqueous electrolyte as claimed in claim 1, wherein the non-aqueous solvent is composed of a mixture of a high dielectric solvent and a low viscosity solvent in a volume ratio of 1:9 to 4:1.
7. A non-aqueous electrolyte as claimed in claim 6, wherein the high dielectric solvent is at least one cyclic carbonate selected from the group consisting of ethylene carbonate (EC), propylene carbonate (PC) and butylene carbonate (BC).
8. A non-aqueous electrolyte as claimed in claim

6, wherein the low viscosity solvent is at least one solvent selected from the group consisting of dimethyl carbonate (DMC), methylethyl carbonate (MEC), diethyl carbonate (DEC), methylpropyl carbonate (MPC),
 5 butylmethyl carbonate (BMC), methylisopropyl carbonate (MIPC), isobutylmethyl carbonate (IBMC), sec-butylmethyl carbonate (SBMC) and tert-butylmethyl carbonate (TBMC), tetrahydrofuran, 2-methyl tetrahydrofuran, 1,4-dioxane, 1,2-dimethoxyethane, 1,2-diethoxyethane, 1,2-
 10 dibutoxyethane γ -butyrolactone, γ -valerolactone, acetonitrile, methyl propionate, and dimethyl formamide.

9. A lithium secondary battery comprising (a) a cathode, (b) an anode and (c) a non-aqueous electrolyte comprising (i) a non-aqueous solvent and (ii) an
 15 electrolyte salt dissolved therein, and (iii) a vinyl sulfone derivative having the formula (I):



(I)

20 wherein R indicates a C_1 to C_{12} alkyl group, C_2 to C_{12} alkenyl group, or C_3 to C_6 cycloalkyl group.

10. A lithium secondary battery as claimed in claim 9, wherein said non-aqueous solvent is mainly composed of
 25 a cyclic carbonate and a cyclic ester and optionally a linear carbonate.

11. A lithium secondary battery as claimed in claim 9, wherein the electrolyte salt is at least one compound selected from the group consisting of LiPF_6 , LiBF_4 ,
 30 LiClO_4 , $\text{LiN}(\text{SO}_2\text{CF}_3)_2$, $\text{LiN}(\text{SO}_2\text{C}_2\text{F}_5)_2$, $\text{LiC}(\text{SO}_2\text{CF}_3)_3$, $\text{LiPF}_3(\text{CF}_3)_3$, $\text{LiPF}_3(\text{C}_2\text{F}_5)_3$, $\text{LiPF}_4(\text{C}_2\text{F}_5)_2$, $\text{LiPF}_5(\text{iso-C}_3\text{F}_7)$, and $\text{LiPF}_4(\text{iso-C}_3\text{F}_7)_2$.

12. A lithium secondary battery as claimed in claim 10, wherein the electrolyte salt is LiBF_4 .

35 13. A lithium secondary battery as claimed in claim 9, wherein the content of the vinyl sulfone derivative (I) is 0.01 to 20% by weight, based upon the total amount

of the electrolyte.

14. A lithium secondary battery as claimed in claim 9, wherein the non-aqueous solvent is composed of a mixture of a high dielectric solvent and a low viscosity solvent in a volume ratio of 1:9 to 4:1.

15. A lithium secondary battery as claimed in claim 9, wherein the high dielectric solvent is at least one cyclic carbonate selected from the group consisting of ethylene carbonate (EC), propylene carbonate (PC) and butylene carbonate (BC).

16. A lithium secondary battery as claimed in claim 9, wherein the low viscosity solvent is at least one solvent selected from the group consisting of dimethyl carbonate (DMC), methylethyl carbonate (MEC), diethyl carbonate (DEC), methylpropyl carbonate (MPC), butylmethyl carbonate (BMC), methylisopropyl carbonate (MIPC), isobutylmethyl carbonate (IBMC), sec-butylmethyl carbonate (SBMC) and tert-butylmethyl carbonate (TBMC), tetrahydrofuran, 2-methyl tetrahydrofuran, 1,4-dioxane, 1,2-dimethoxyethane, 1,2-diethoxyethane, 1,2-dibutoxyethane γ -butyrolactone, γ -valerolactone, acetonitrile, methyl propionate, and dimethyl formamide.

17. A lithium secondary battery as claimed in claim 9, wherein said anode is composed of a carbonaceous material having a graphite-type crystal structure having a lattice spacing (d_{002}) of the lattice face (002) of 0.335 to 0.340 nm.